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Coats et al.

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(54) **METHOD AND APPARATUS FOR INSTALLING A RAIL ON A TIE IN A RAILROAD SYSTEM**

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(52) **U.S. Cl.**
CPC ***E01B 9/483*** (2013.01)

(58) **Field of Classification Search**
CPC E01B 9/483
See application file for complete search history.

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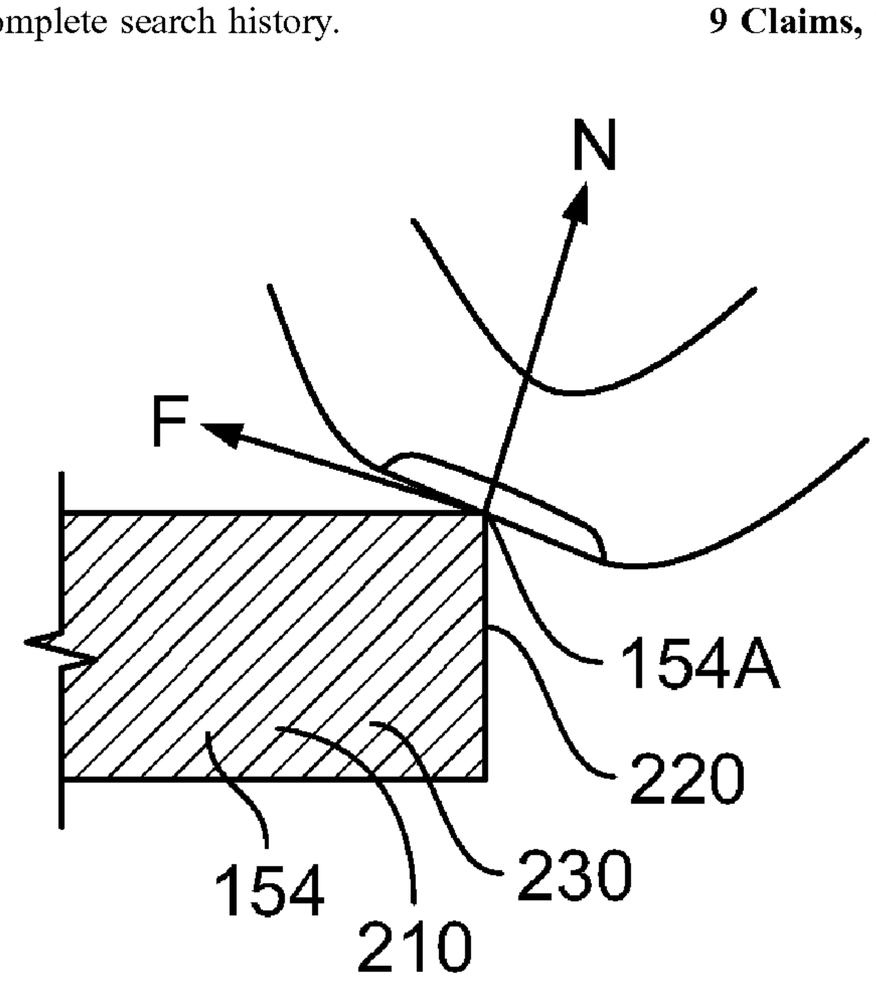
(57) **ABSTRACT**

A plate assembly for securing a rail to a tie that includes a clip and a shoulder with an orifice. At least one of the clip and the shoulder are modified by changing their respective shape to form a positive interference fit therebetween. The modification is provided to ensure that the clip is maintained with its leg partially inserted into the shoulder orifice during staging.

9 Claims, 8 Drawing Sheets



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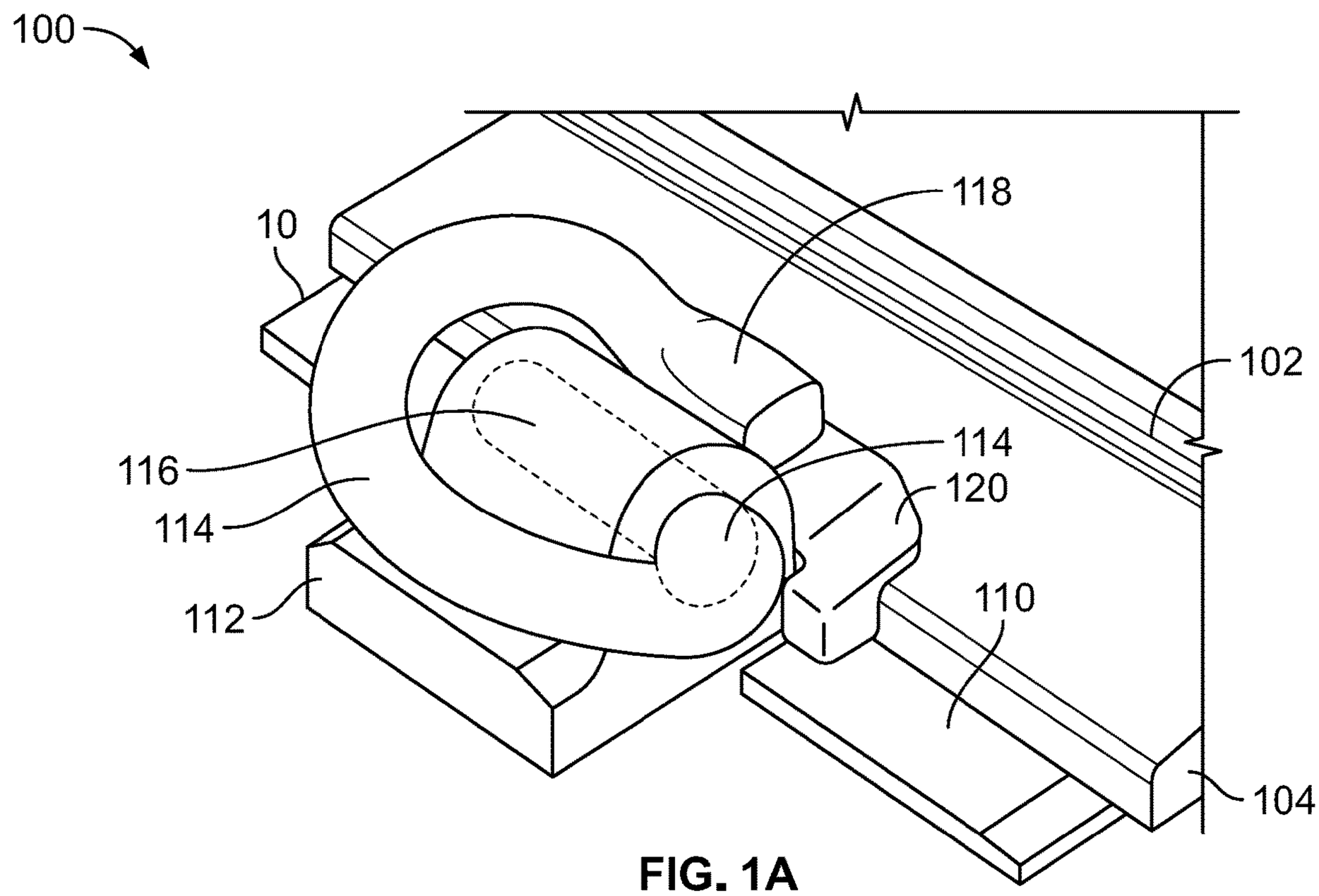

FIG. 1A
(Prior Art)

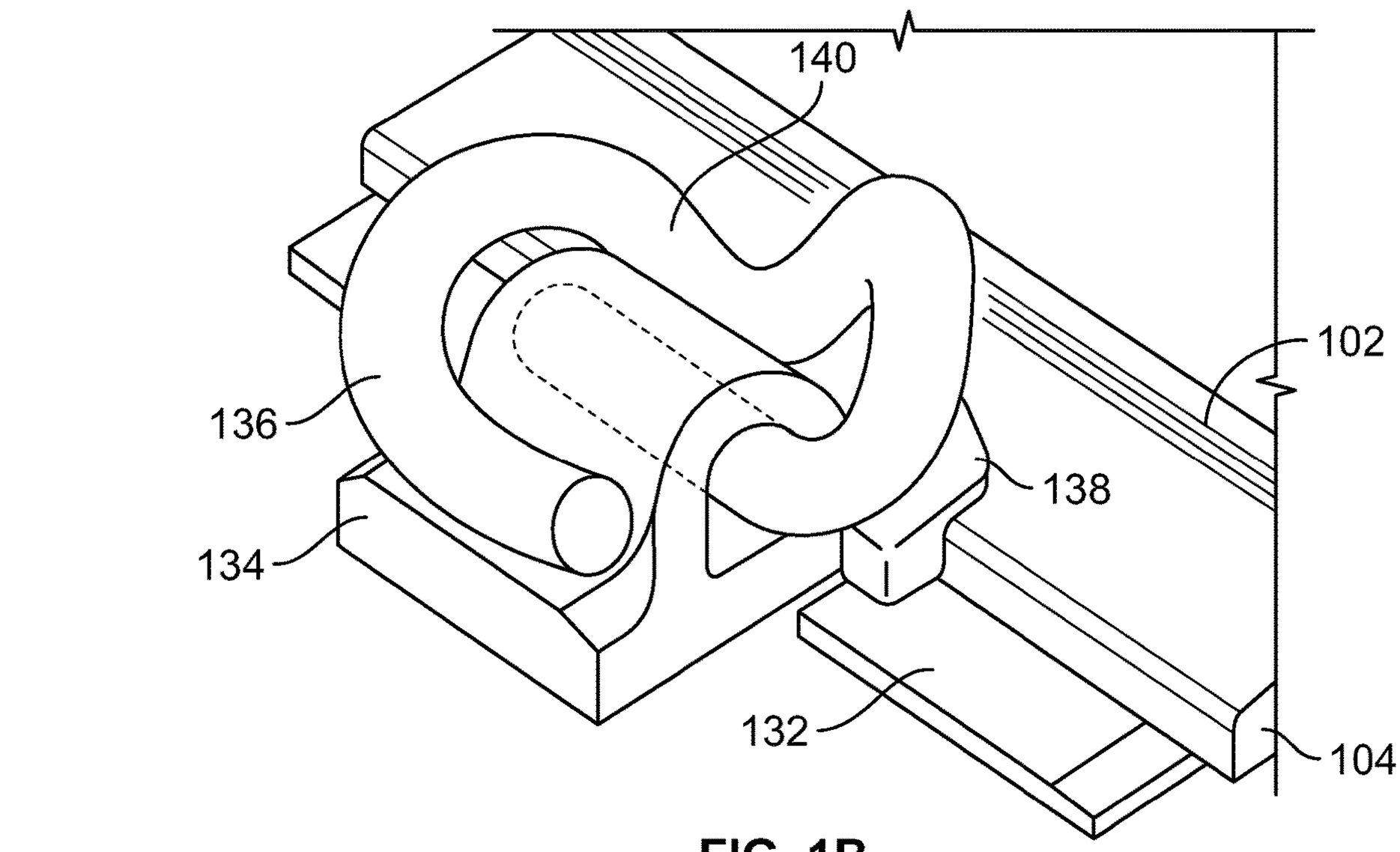

FIG. 1B
(Prior Art)

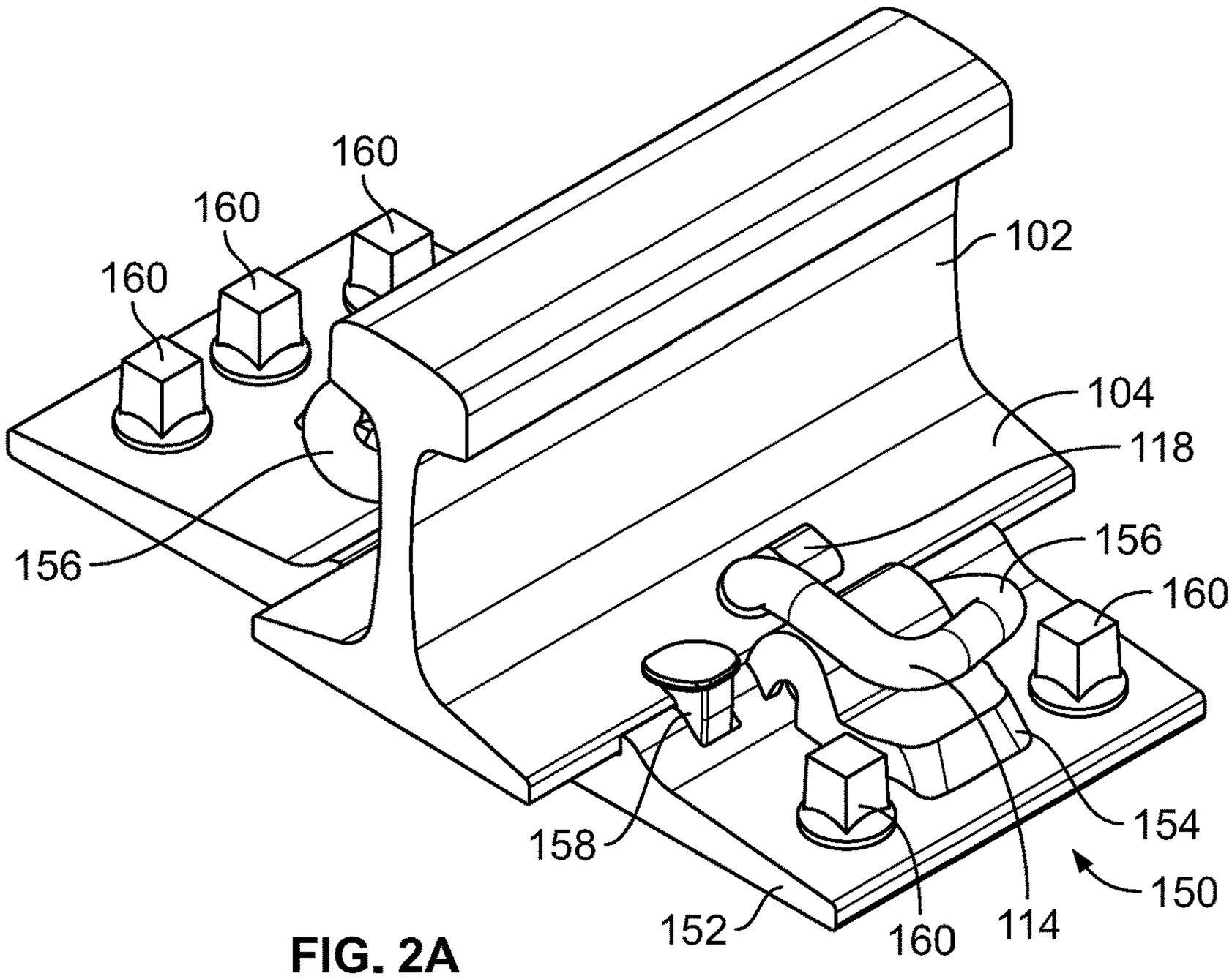

FIG. 2A
(Prior Art)

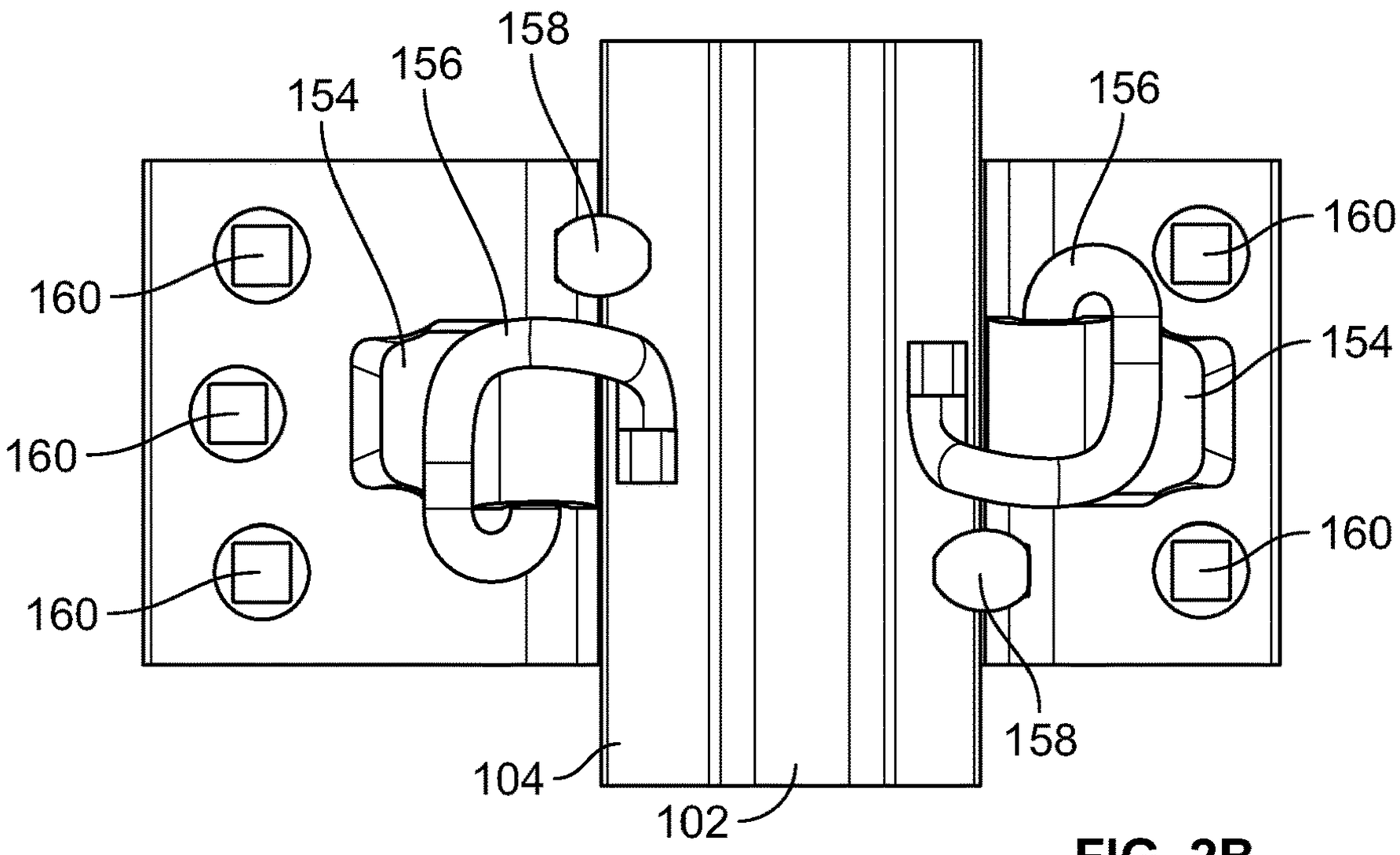

FIG. 2B
(Prior Art)

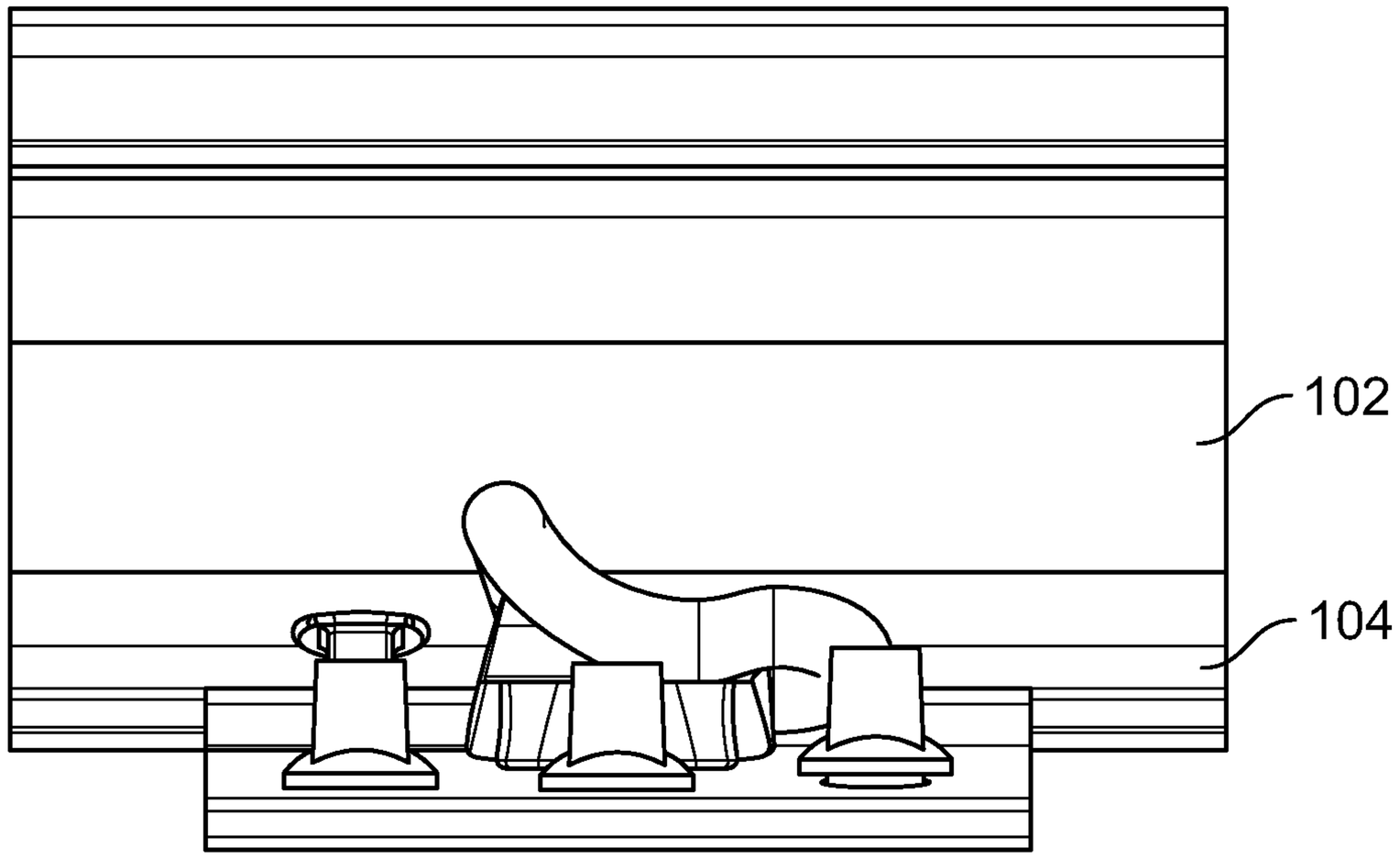

FIG. 2C
(Prior Art)

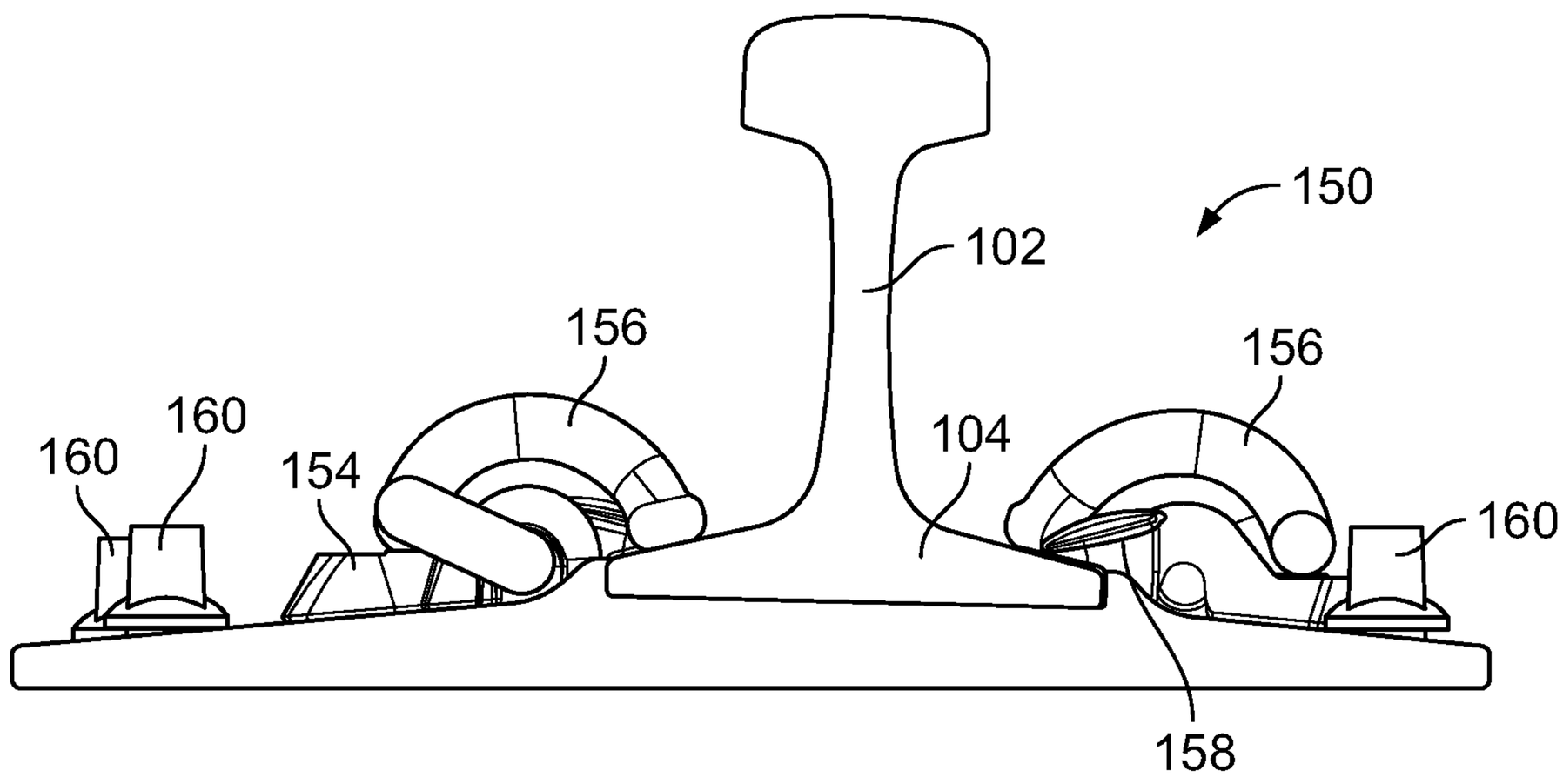

FIG. 2D
(Prior Art)

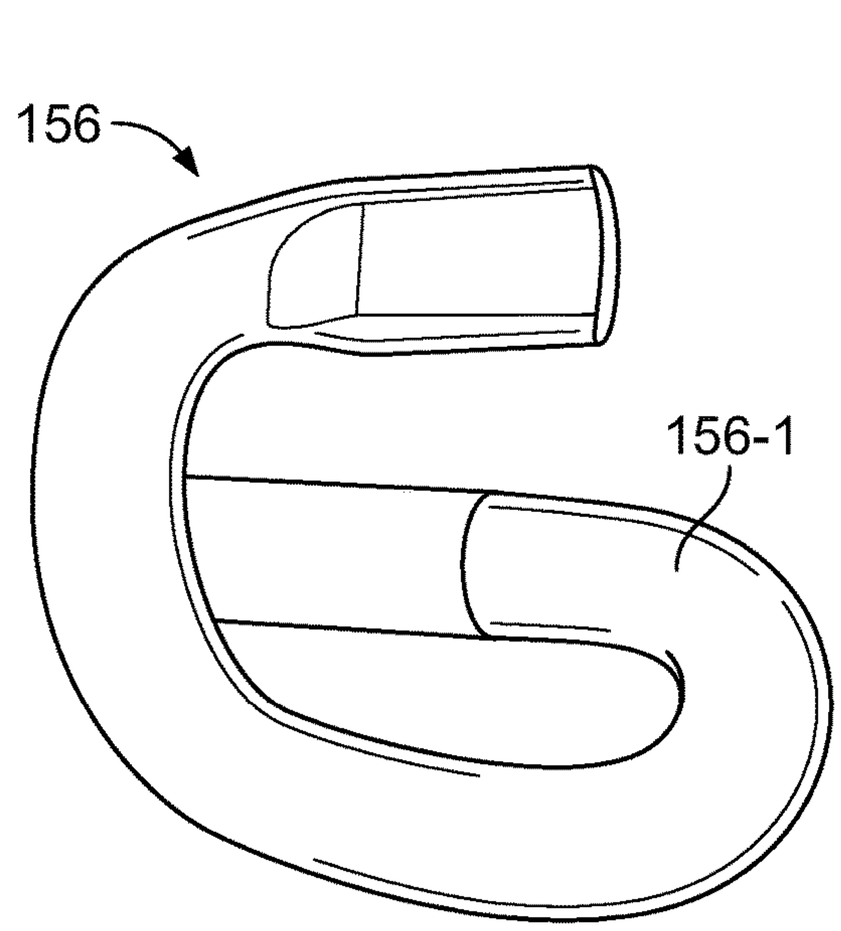

FIG. 3
(Prior Art)

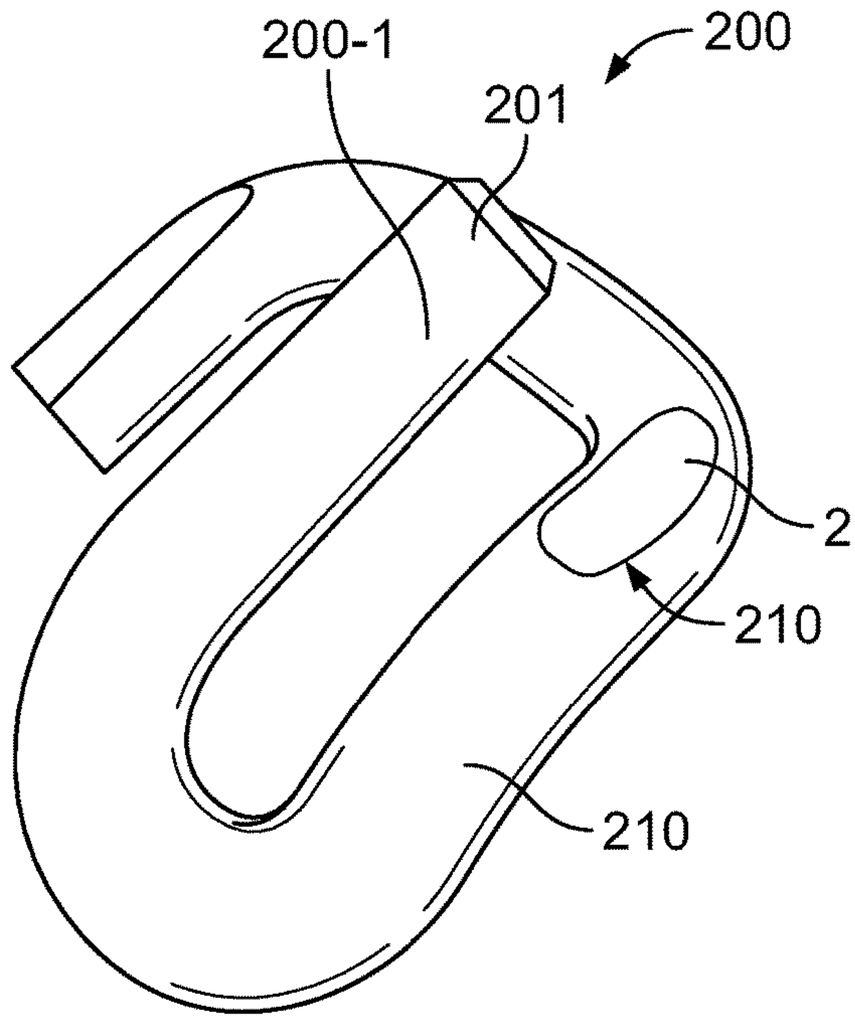

FIG. 4A
(Prior Art)

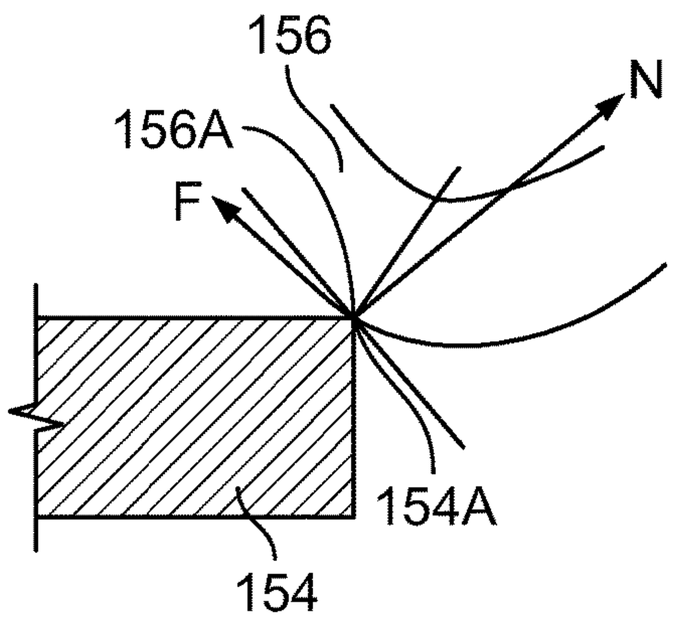

FIG. 4B
(Prior Art)

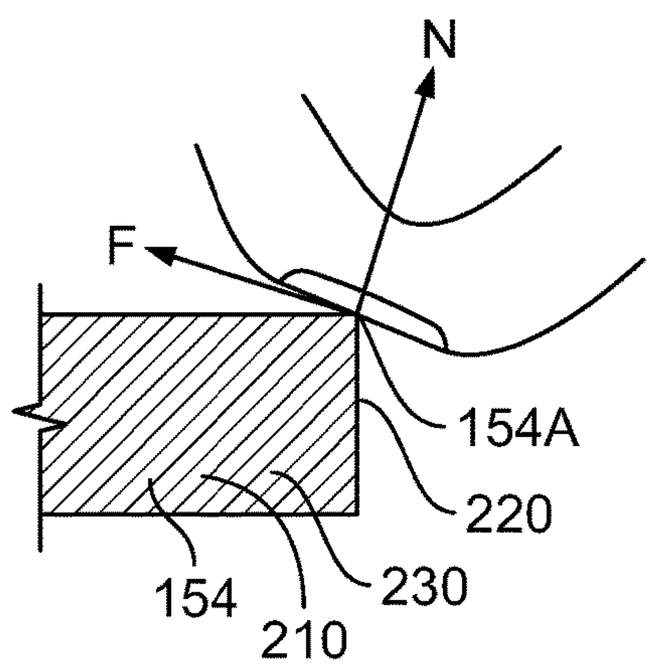

FIG. 4C

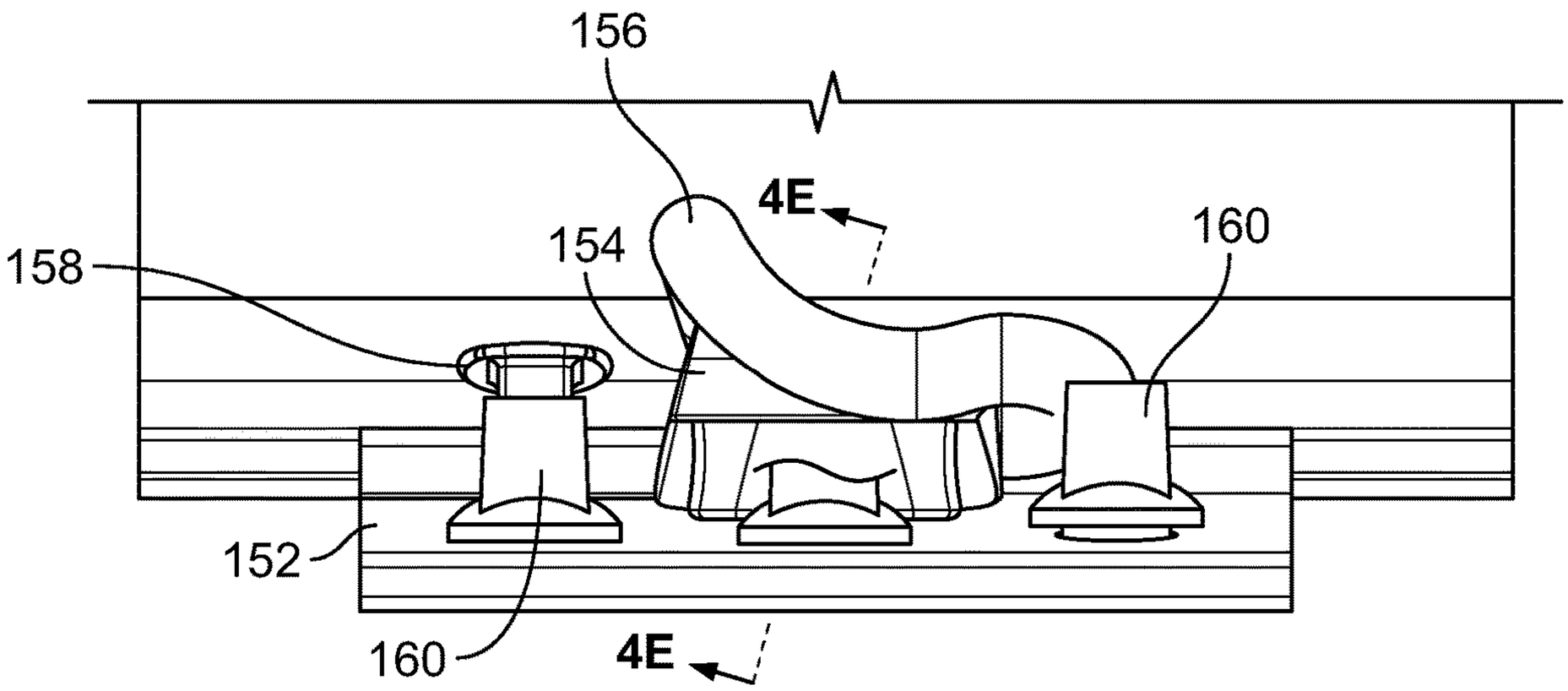

FIG. 4D
(Prior Art)

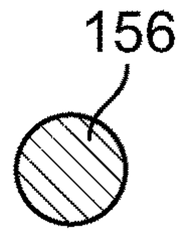

FIG. 4E
(Prior Art)

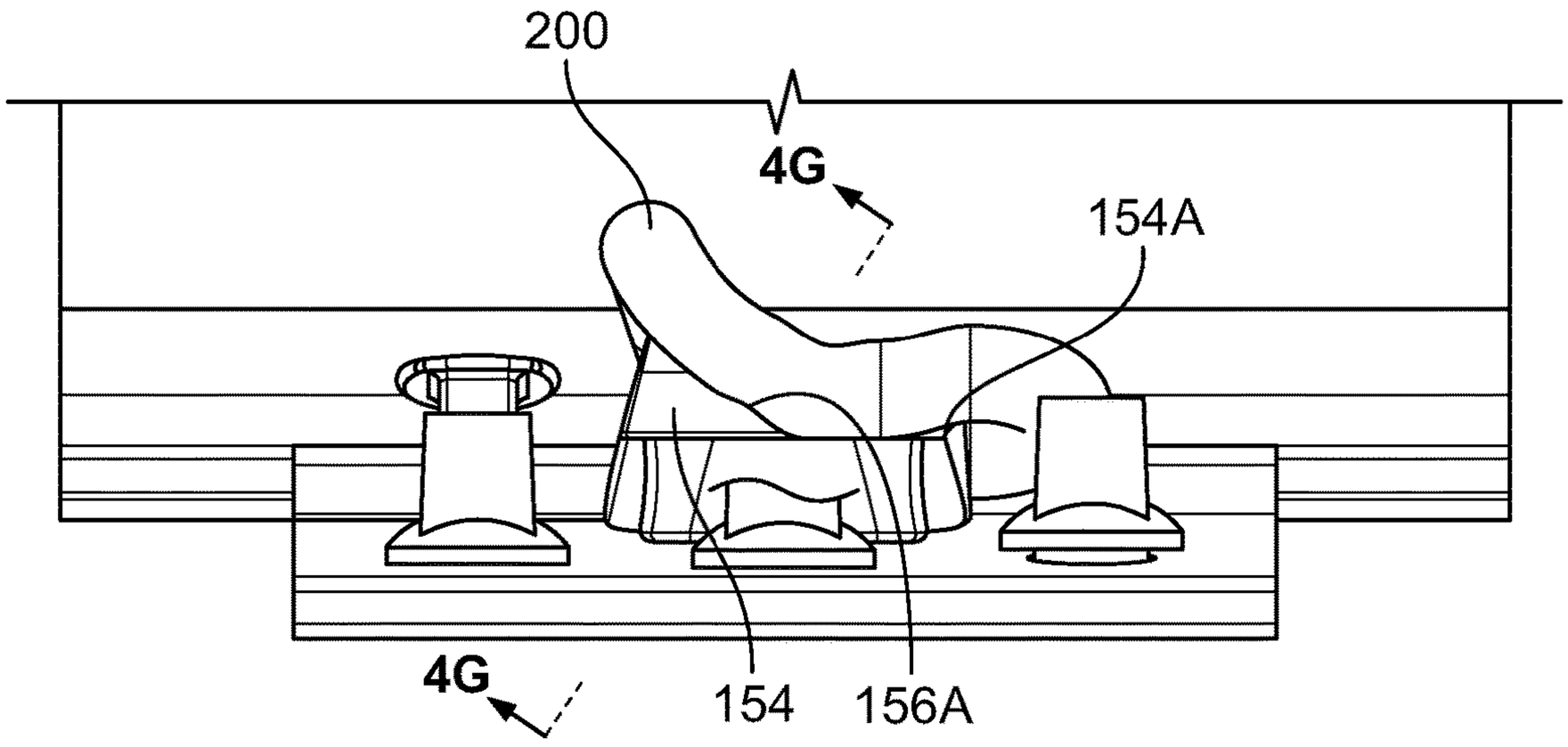

FIG. 4F

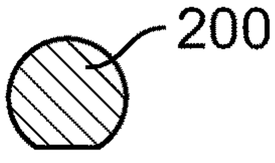

FIG. 4G

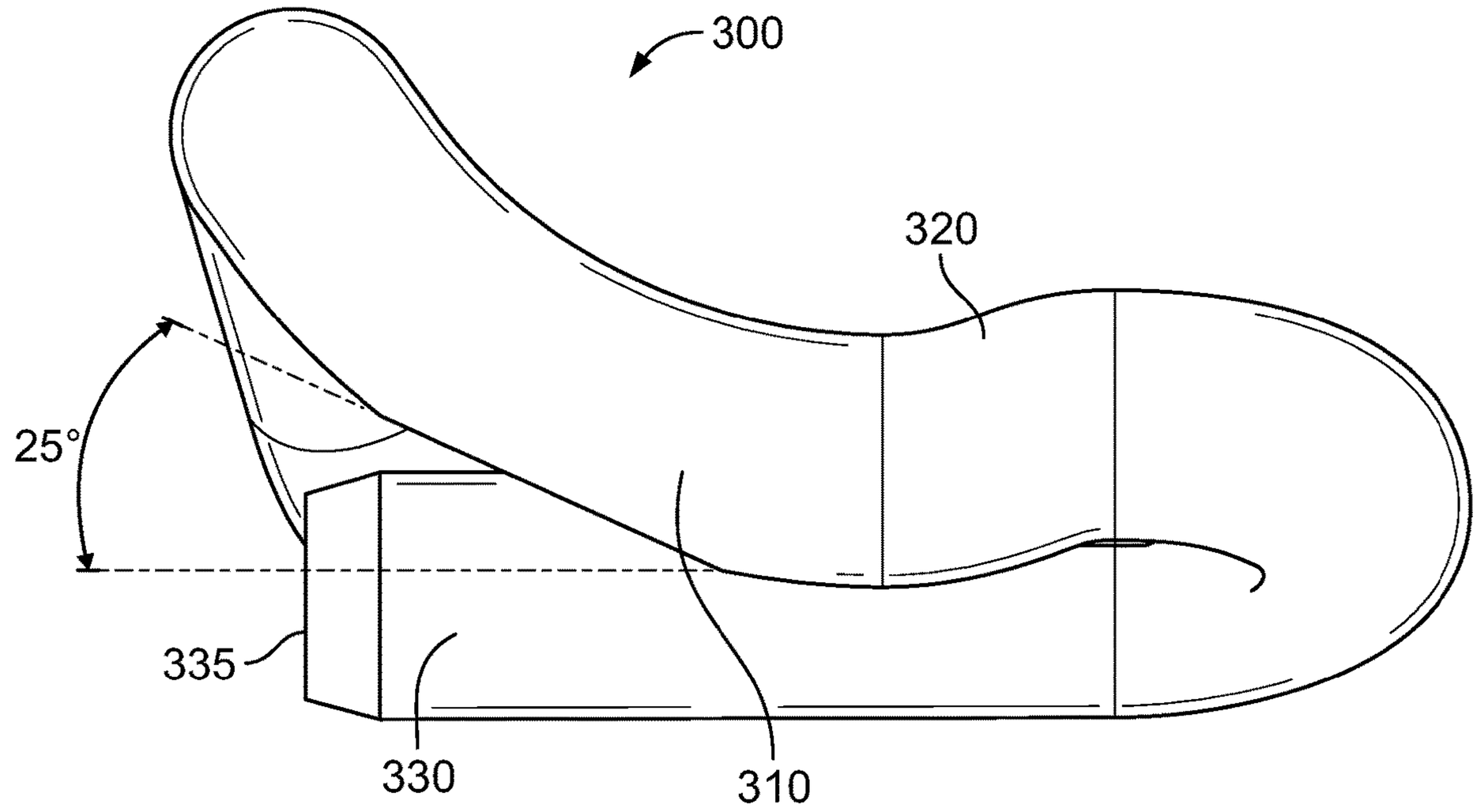

FIG. 5

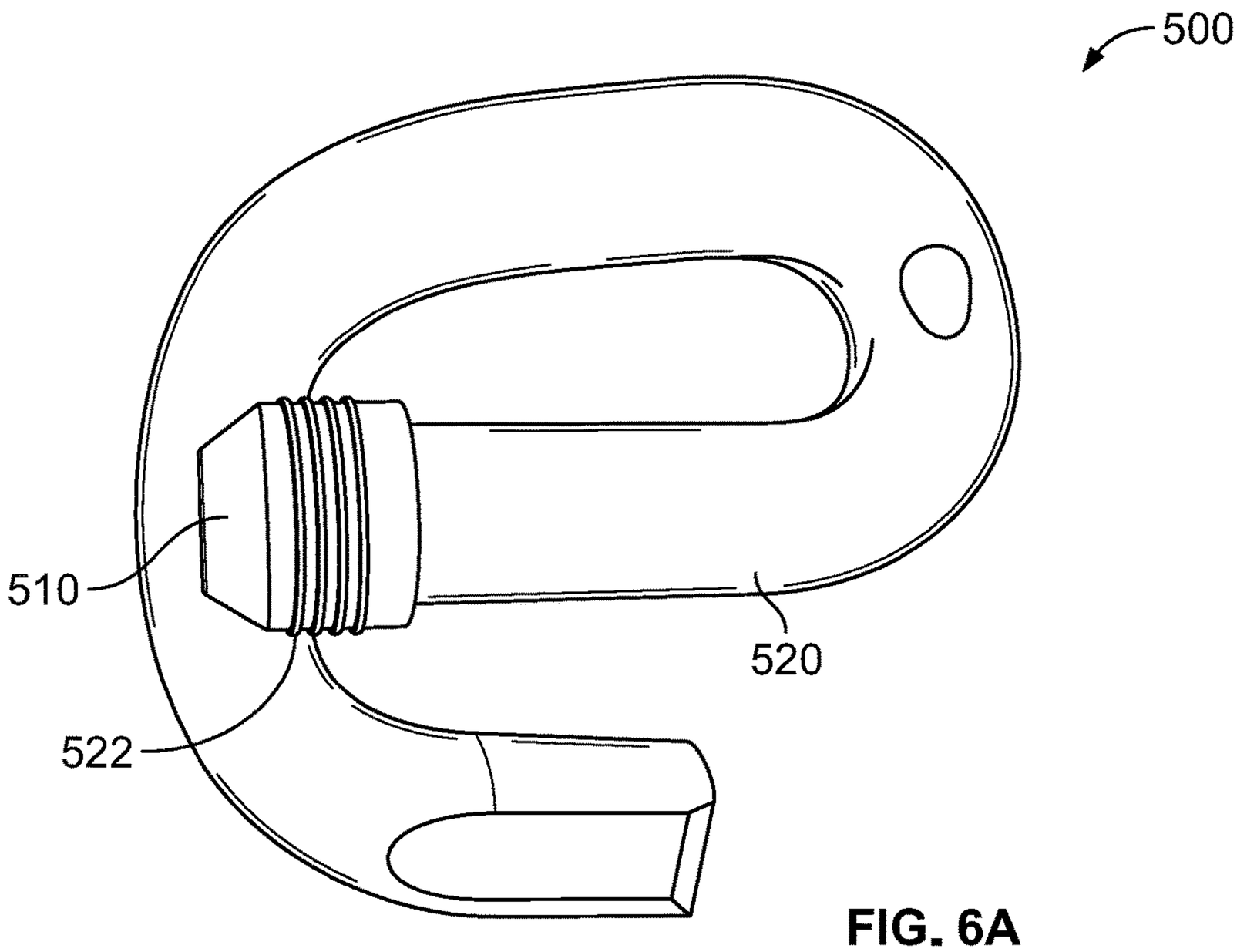

FIG. 6A

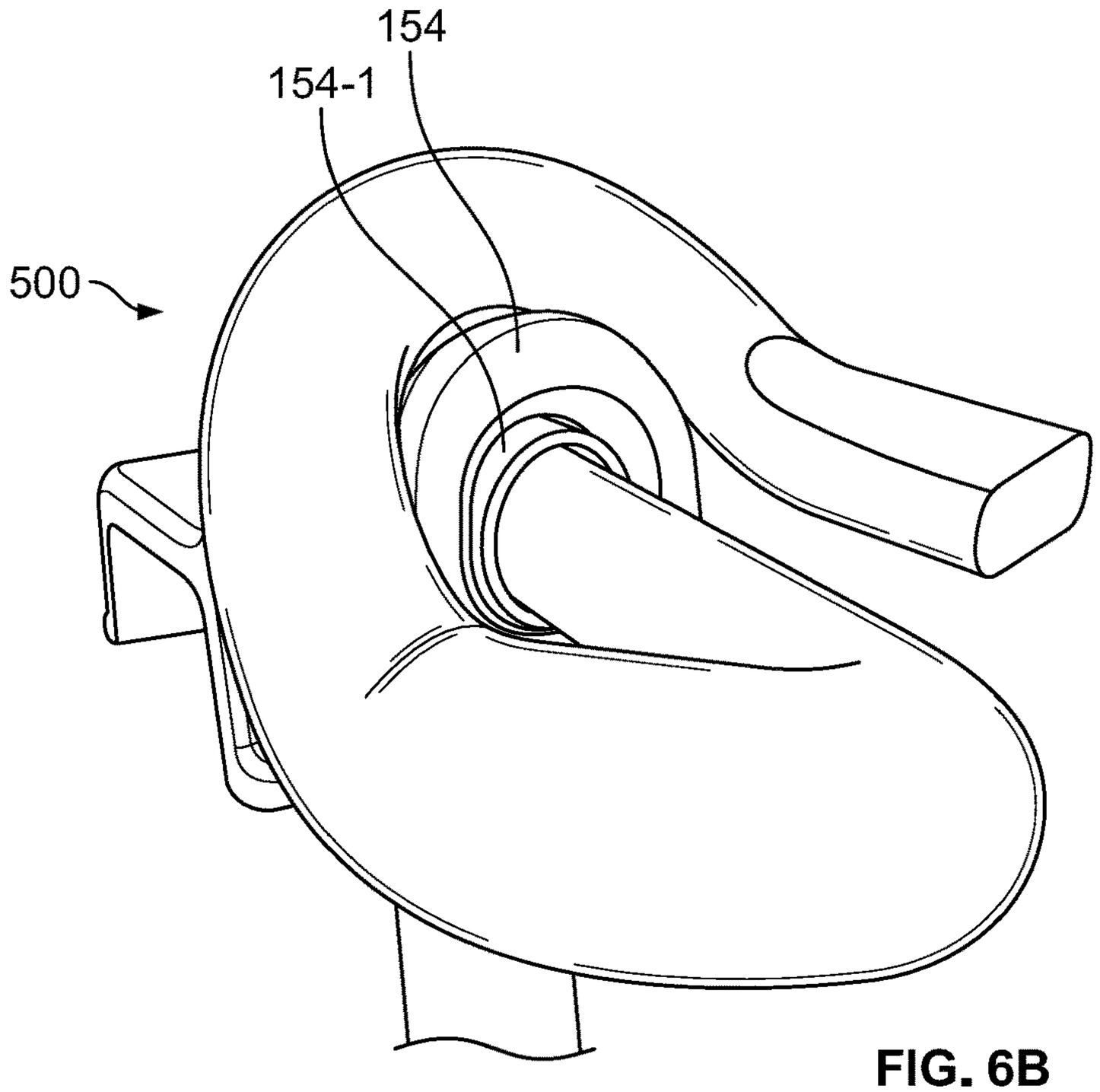

FIG. 6B

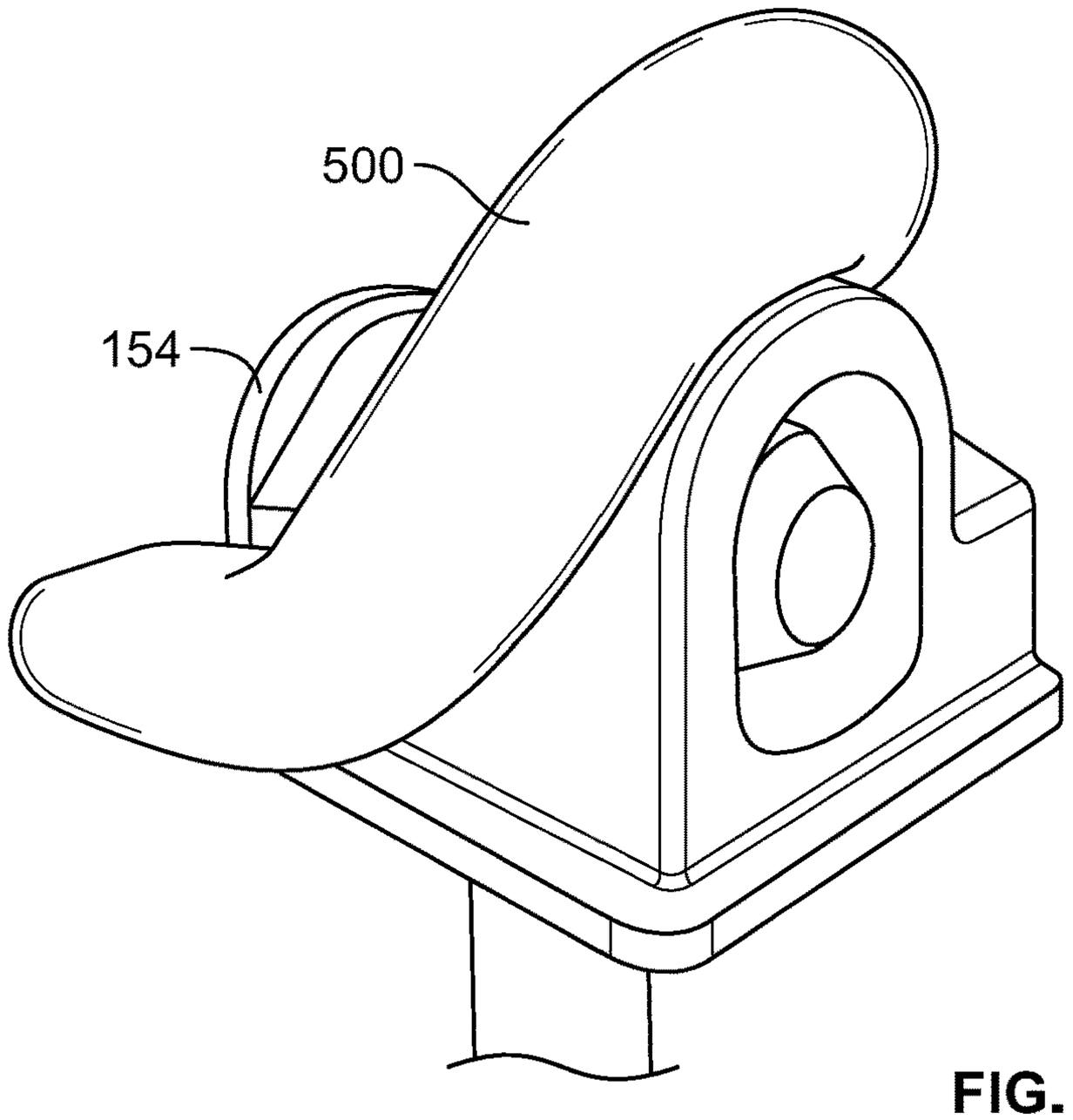

FIG. 6C

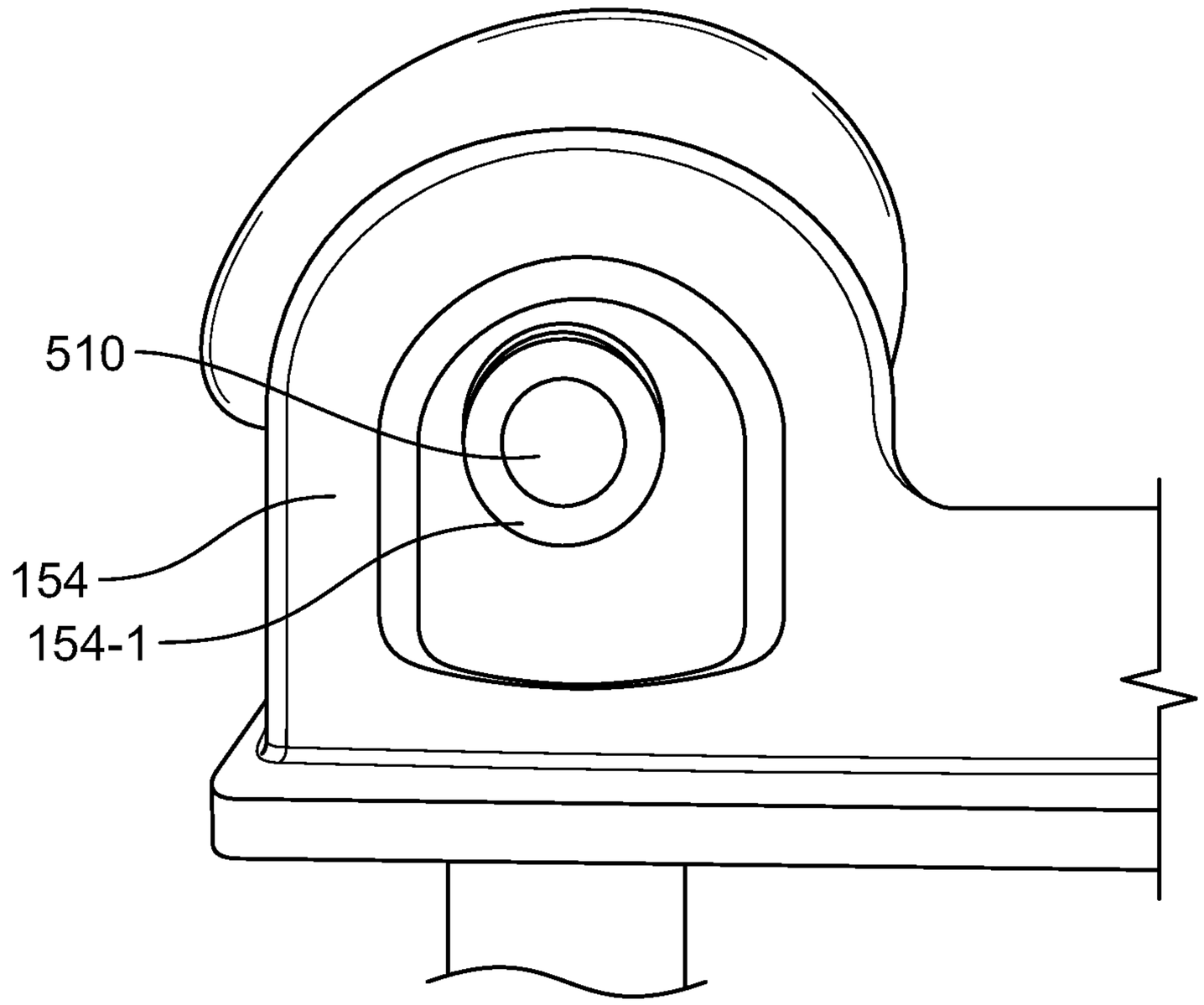

FIG. 6D

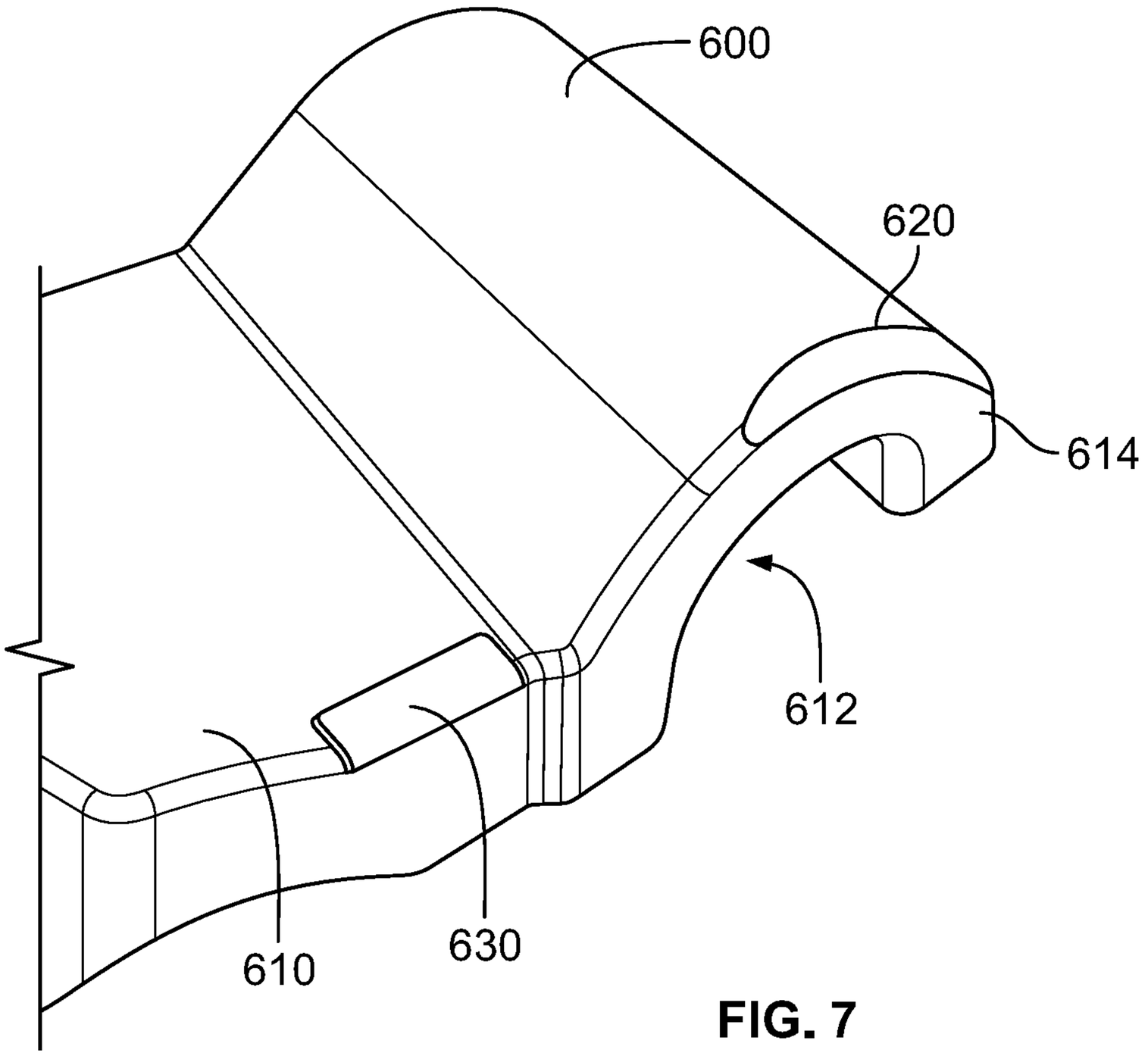

FIG. 7

METHOD AND APPARATUS FOR INSTALLING A RAIL ON A TIE IN A RAILROAD SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

This patent application claims benefit under 35 U.S.C. § 119 to U.S. Provisional Patent Application No. 62/374,410, filed Aug. 12, 2016, which is hereby incorporated by reference in its entirety as part of the present disclosure.

FIELD OF INVENTION

The present disclosure is directed to a rail system that includes a rail that is installed on or attached to a tie using a shoulder and a clip and more specifically to a rail system that includes a rail that is installed on or attached to a tie by a shoulder and clip wherein the center leg of the clip is maintained within the shoulder during staging.

BACKGROUND

Rails of a railroad system are typically supported on ties (made of wood, concrete, etc.) using plate assemblies. Each plate assembly normally may include, in sequence, a pad resting on a tie, a flat steel plate that has a sleeve-shaped shoulder resting on the pad, a clip and an insulator. The clip typically has two legs, is made of high-grade steel and acts as a spring forcing a foot or flange of the rail against the plate. This action ensures that the rail stays in position and does not move excessively as railroad cars pass over it.

For new installations, sections of track can be preassembled with the rails mounted on ties before the sections are laid. When tracks need repair or reconstruction, the various components discussed above must be assembled in the field. As part of this process, the clip is positioned manually with one of its legs extending partially into the shoulder. Once each pad assembly is positioned under the rail, the clip is pressed into position so that one of its legs passes through the sleeve and the other leg engages the rail. This step is performed either manually, with heavy hammers, or by using a pneumatic or hydraulic tool, which may be hand-held or vehicle-mounted. This whole process is called staging. An apparatus for performing staging is shown in U.S. Pat. No. 8,499,695.

A problem well-known in the field is that between the time the clip is positioned on the plate and the time that it is pressed into position to bias the rail against the plate, the clip is not restrained in any manner. Therefore, frequently the clip comes loose and separates from the plate. Once the clip moves out of place, it must be repositioned, thereby slowing down the staging. Moreover, any attempt made to press the clip into its final place when it is out of position may result in accidents and or damage to some of the other components of the plate assembly.

There have been attempts to resolve this problem in the past but by and large they were not successful.

SUMMARY OF THE INVENTION

The disclosure is directed to an assembly and a method of securing a rail, which has a rail foot, to a tie.

In an embodiment, the assembly includes a clip that has a first leg, a second leg, a section disposed between the first and second legs and a shoulder that has an orifice adapted to receive the first leg and a shoulder edge.

The clip has a first position in which the first leg is partially inserted into the orifice with the section disposed in contact with the edge and a second position in which the leg is fully inserted into the orifice and the clip abuts the rail foot.

Importantly, the section of the clip has a flat zone includes a planar surface arranged and sized to maintain the clip in the first position and prevent the clip from separating from the shoulder.

The clip can have circular cross-section except at the section.

The clip can form an interference fit with the shoulder in the first position.

In another embodiment, an assembly includes clip that has a first leg and a second leg and a section disposed between the first and second legs. The assembly further includes a shoulder that has an orifice adapted to receive the first leg and a shoulder edge. The clip has a first position in which the first leg is partially inserted into the orifice with the section being disposed in contact with the edge and a second position in which the leg is fully inserted into the orifice and the clip abuts the rail foot. The clip section is straight and is shaped and sized to form an interference fit with the shoulder to maintain the clip in said first position and prevent the clip from separating from the shoulder.

In another embodiment, the shoulder is formed with soft, plastic segments arranged and constructed to create an interference fit with the clip to maintain the clip in the first position and prevent the clip from separating from the shoulder.

BRIEF DESCRIPTION OF THE FIGURES

FIGS. **1**A and **1**B are orthogonal views of two conventional plate assemblies using two different types of clips;

FIGS. **2**A-**2**D views showing a typical rail mounted on a tie using a plate and an e-type clip;

FIG. **3** is a top perspective view of a conventional e-type clip used in the assembly of FIGS. **2**A-**2**D;

FIG. **4**A is a top view of an e-type clip with a flat area for temporarily engaging the shoulder of a plate assembly;

FIG. **4**B is a cross-sectional view of a shoulder and a conventional e-type clip resting on the shoulder prior to installation;

FIG. **4**C is a cross-sectional view of a shoulder and the modified e-type clip is resting on the shoulder;

FIG. **4**D is a side view of a conventional assembly with an e-type clip;

FIG. **4**E is a cross-sectional view of the clip of FIG. **4**D taken along lines **4**E-**4**E;

FIG. **4**F is a side view of an assembly using the clip of FIG. **4**A after installation;

FIG. **4**G is a cross-sectional view of the clip of FIG. **4**F taken along line **4**G-**4**G;

FIG. **5** is a side view of another embodiment of the present invention where a portion of an e-type clip is bent to form a straight section;

FIGS. **6**A-**6**D are several views of another embodiment of the present invention where a cap is inserted on the central leg of an e-type clip; and

FIG. **7** is another embodiment of the present invention where the shoulder rather than a clip is modified.

DETAILED DESCRIPTION OF THE INVENTION

With reference now to the drawings, and in particular to FIGS. **1** through **7**, embodiments for maintaining a clip

temporarily engaged with the shoulder during the staging operation to ensure that the clip is positioned properly for engaging a rail will be described.

FIGS. **1**A, **1**B, **2**A-**2**D show details of conventional rail assemblies in which a rail is supported on a tie includes a plate and/or pad, a shoulder, a clip and, optionally, an insulator.

In FIG. **1**A, an assembly **100** is used to attach a rail **102** that has a foot **104** to a tie (not shown). The assembly **100** includes a pad **110**, a shoulder **112**, a clip **114** with a center leg **116** and a toe **118** and an insulator **120**. Once the assembly **100** is installed, the center leg **116** is seated inside the shoulder **112** and the toe **118** and an insulator **120** press the foot **104** of rail **102** downward and secure the rail **102**.

FIG. **1**B shows another assembly **130**. The assembly **130**, like assembly **100**, has a pad **132**, a shoulder **134**, a clip **136** and an insulator **138**. However, here, the clip **136** has an intermediate section **140** that is positioned to press down on the insulator **138**.

FIGS. **2**A-**2**D depict an assembly **150** that is similar to assembly **100**. The assembly **150** includes a plate **102**, a shoulder **154**, and an e-shaped clip **156**. Insulators are optional and have been omitted from the figures. The rail foot **104** is secured by spikes **158** and the plate **102** is secured by spikes **160**.

Pursuant to embodiments of the present disclosure, components of a rail support assembly, such as those shown in FIGS. **1**A-**1**B and **2**A-**2**D have been modified to create an interference fit between the clip and the shoulder. The interference fit is sufficient to wedge and hold the clip in proper position with respect to the shoulder and its leg does not fall out of the shoulder.

FIGS. **4**B, **4**D and **4**E show the respective positions of the shoulder **154** and clip **156**. In FIG. **4**B, prior to the installation of the clip **156**, the clip **156** is arranged such that a relatively small region or point **156**A touches an edge **154**A of the shoulder **154**. FIG. **4**E shows a cross-section of the clip **156** taken at the contact point with edge **154**A. At the contact point, a friction force F is generated in the direction shown. Normally, the clip **156** is positioned so that its leg **156-1** is inserted into a hole of the shoulder **154** (not shown). The clip **156** is then released and a hammer or a pneumatic tool is used to push the clip **156** until it is fully seated (see FIG. **4**D). It has been found that this force F may not sufficient to hold the clip **156** in place after the person releases it and therefore it may move out of place and even fall out.

In an embodiment, a portion of the clip is flattened to provide an interference fit. For example, as shown in FIG. **4**A, a clip **200** includes a leg **201** and a section **210** (referred to as the heel seat) has at least one flattened portion defining a flat zone **212**. When the leg **200-1** of the clip **200** is partially inserted into a shoulder hole (not shown), the flat zone **212** is disposed adjacent to the edge **154**A of the shoulder **154**. The actual contact between the clip **200** and the shoulder **154** occurs within the flat zone **212** as shown in FIG. **4**A. Because of the orientation of the flat zone **212**, any movement of the clip **200** away from the shoulder **154** is opposed by a frictional force F**1**. This force F**1** is larger than force F and prevents the clip **200** from moving out of position.

FIG. **4**F shows the relative positions of the shoulder **154** and clip **200** after the clip **200** is installed. FIG. **4**G shows a cross section of the clip **200** at zone **212**.

FIG. **5** shows another embodiment in which a plate assembly is provided with a clip **300**. In this embodiment, clip includes a portion **310** on a heel **320** which is not curved (as in conventional clips) but is shaped so that it is linear for a distance of at least 18 mm and is disposed at an angle of about 25 degrees with respect to the center leg **330**. As a result of this structure, when the clip **300** is positioned for staging, the heel **320** and the center leg **330** acts as a spring and grab the shoulder between them in a spring-like manner. As a result, the clip **300** will not fall out of the shoulder. Preferably, the center leg is chamfered as at **335** to facilitate inserting the center leg **330** into the shoulder orifice (not shown).

In another embodiment shown in FIGS. **6**A-**6**D, a clip **500** is similar to clip **156** in FIGS. **2**A-**2**D and is provided with a plastic cap **510** on the center leg **520**. The cap **510** may be provided with several annular ribs **520** that engage the inner wall of the shoulder orifice **154-1** of shoulder **154** (See FIGS. **6**B, **6**C, **6**D) and insure that the clip **500** does not fall out during staging. The cap **510** may be made by molding or other well-known techniques.

In another embodiment shown in FIG. **7**, instead of, or in addition to modifying the clip, a shoulder **600**, similar to shoulder **154** is modified by adding, preferably elastomeric, material to the shoulder. Shoulder **600** includes an edge **610** and a sleeve **614** forming an orifice **612** for receiving the leg of a clip, such as clip **156**. For example, the elastomeric material may be added on the sleeve **614** such as at **620**. In addition, or instead, elastomeric material **630** may be added to the edge **610**. These locations are selected to increase the frictional engagement between the shoulder and the relevant sections of the clip, such as its arch or heel seat. Instead of adding material, the shoulder itself may be cast with these additional elements selected to insure that the clip does not back out and fall off the shoulder.

In addition, to the techniques described above, other modifications may be made. For example, one or both of the shoulder and clip may be magnetized so they are kept together by a magnetic force therebetween.

Although the description above and accompanying drawings contains much specificity, the details provided should not be construed as limiting the scope of the embodiments, but merely as describing some of the features of the embodiments. The description and figures should not to be taken as restrictive and are understood as broad and general teachings in accordance with the present invention. While the embodiments have been described using specific terms, such description is for illustrative purposes only, and it is to be understood that modifications and variations to such embodiments, including, but not limited to, the substitutions of equivalent features and terminology may be readily apparent to those of skill in the art based upon this disclosure without departing from the spirit and scope of the invention.

What is claimed is:

1. An assembly securing a rail to a tie, the rail having a rail foot, the assembly comprising:

a clip having a first leg, a second leg and a heel disposed between the first leg and the second leg, the heel including portion extending linearly between the first leg and the second leg; and

a shoulder having an orifice adapted to receive the first leg and a shoulder edge,

wherein when the first leg is partially inserted into the orifice of the shoulder, the first leg and the heel are adapted to grip the shoulder between the first leg and the heel in a spring-like manner to secure the clip within the shoulder.

2. The assembly of claim **1**, wherein the clip forms an interference fit with the shoulder when the first leg and the heel grip the shoulder.

3. An assembly securing a rail to a tie, the rail having a rail foot, the assembly comprising:

a clip haying a first leg, a second leg and a section disposed between the first leg and the second leg, the section includes a heel having a portion thereof extending straight between the first leg and the second leg; and

a shoulder having an orifice adapted to receive the first leg and a shoulder edge,

wherein, in a first position, the first leg is partially inserted into the orifice and the heel is disposed in contact with the shoulder edge and, in a second position, the first leg is fully inserted into the orifice and the clip abuts the rail foot, and

wherein the straight section of the heel is shaped and sized to form an interference fit with the shoulder to maintain the clip in said first position and prevent the clip from separating from the shoulder.

4. An assembly securing a rail to a tie, the rail having a rail foot, the assembly comprising:

a clip having a first leg, a second leg and a section disposed between the first leg and second leg, the section includes a heel having portion extending linearly between the first leg and the second leg; and

a shoulder having an orifice adapted to receive the first leg and a shoulder edge,

wherein, in a first position, the first leg is partially inserted into the orifice of the shoulder with the first leg and heel adapted to grip the shoulder between the first leg and the heel in a spring-like manner to secure the clip within the shoulder and, in a second position, the first leg is fully inserted into the orifice and the clip abuts the rail foot, and

wherein the shoulder has a section made of plastic material that is arranged and constructed to form an interference fit with the clip to maintain the clip in the first position and prevent the clip from separating from the shoulder.

5. The assembly of claim 1, Wherein the heel extends linearly for at least 11 mm.

6. The assembly of claim 1, wherein the portion of the heel extending linearly is disposed at an angle of about 25 degrees with respect to the first leg.

7. The assembly of claim 1, wherein the first leg is chamfered at a distal end to facilitate inserting the first leg into the orifice of the shoulder.

8. The assembly of claim 1, further comprising a cap extending over a distal end of the first leg.

9. The assembly of claim 8, wherein the cap includes a plurality of annular ribs that are configured to engage an inner wall of the orifice of the shoulder.

* * * * *